

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings of claims in the application:

Listing of Claims:

1 - 17. (Canceled)

- 1 18. (New): A method of sharing data in a computer system, said computer
2 system comprising a first computer, a second computer, and a storage system comprising a disk
3 control unit, a first disk unit, a second disk unit, and a third disk unit, the method comprising:
4 forming a duplex state between said first disk unit and said second disk unit,
5 wherein said disk control unit, in response to a write request from said first computer, stores
6 write data associated therewith to both said first disk unit and to said second disk unit;
7 forming a simplex state, wherein said disk control unit, in response to a write
8 request from said first computer, stores write data associated therewith only to said first disk
9 unit; and
10 subsequent to said step of forming a simplex state, re-mapping a disk identifier,
11 said second computer using said disk identifier to access said storage system,
12 wherein said disk identifier is associated with said third disk unit before said re-
13 mapping and said disk identifier is associated with said second disk unit after said re-mapping,
14 whereby said third disk unit is accessed when said second computer accesses said storage system
15 at a time prior to said re-mapping and said second disk unit is accessed when said second
16 computer accesses said storage system at a time subsequent to said re-mapping.
- 1 19. (New): A method of sharing data according to claim 18, further
2 comprising, subsequent to said step of re-mapping, forming a duplex state between said first disk
3 unit and said third disk unit.

1 20. (New): A method of sharing data in a computer system, said computer
2 system comprising a first computer, a second computer, and a storage system comprising a disk
3 control unit, a first disk unit, a second disk unit, a third disk unit, and a fourth disk unit, the
4 method comprising:

5 forming a duplex state between said first disk unit and said second disk unit,
6 wherein said disk control unit, in response to a write request from said first computer, stores
7 write data associated therewith to both said first disk unit and to said second disk unit;

8 forming a simplex state, wherein said disk control unit, in response to a write
9 request from said first computer, stores write data associated therewith only to said first disk
10 unit; and

11 subsequent to said step of forming a simplex state, copying data stored in said
12 second disk unit to said third disk unit and re-mapping a disk identifier, said second computer
13 using said disk identifier to access said storage system,

14 wherein said disk identifier is associated with said fourth disk unit before said re-
15 mapping and said disk identifier is associated with said third disk unit after said re-mapping,
16 whereby said fourth disk unit is accessed when said second computer accesses said storage
17 system at a time prior to said re-mapping and said third disk unit is accessed when said second
18 computer accesses said storage system at a time subsequent to said re-mapping.

1 21. (New): A method of sharing data according to claim 20, wherein said step
2 of copying data includes steps of:

3 converting a first data format of data stored in said second disk unit to a second
4 data format; and

5 storing said data according to said second data format to said fourth disk unit.

1 22. (New): A method of sharing data according to claim 21, wherein said first
2 data format is a count key data format and said second data format is a fixed-length block format.

1 23. (New): A method of sharing data according to claim 20, wherein said
2 computer system further comprises a processor coupled to said storage system, and said step of
3 copying data is performed by said processor.

1 24. (New): A method of sharing data in a computer system, said computer
2 system comprising a first computer, a second computer, and a storage system comprising a first
3 disk unit accessed from said first computer, a second disk unit, a third disk unit storing a copy of
4 data that was stored in said first disk unit at a first time, a fourth disk unit accessed from said
5 second computer, and a disk control unit accessing one or more of said disk units, the method
6 comprising steps of:

7 updating data stored in said first disk unit and storing update data and its address
8 to said second disk unit, in response to a write request from said first computer, wherein said
9 update data and its address are determined from said write request;

10 writing check points to said second disk unit in response to transactions executed
11 by said first computer;

12 updating data stored in said third disk unit by reading update data stored in said
13 second disk unit and writing said update data to said third disk unit according to said
14 checkpoints;

15 forming a duplex state between said third disk unit and said forth disk unit by
16 copying data stored in said third disk unit to said fourth disk unit; and

17 after copying data stored in said third disk unit to said fourth disk unit, accessing
18 said fourth disk unit from said second computer.

1 25. (New): A method of sharing data according to claim 24, wherein said
2 computer system further comprises a processor coupled to said storage system, and said step of
3 updating data stored in said third disk unit is executed by said processor.

1 26. (New): A method of sharing data according to claim 25, wherein said
2 processor maintains a checkpoint designating a latest accessed update data in said second disk
3 unit, and said step of updating data stored in said third disk unit includes steps of:
4 reading update data stored in said second disk unit, said update data being
5 designated by a checkpoint maintained in said processor and said latest check point stored in said
6 second disk unit; and
7 writing said update data read from said second disk unit to said third disk unit.

1 27. (New): A method of sharing data in a computer system, said computer
2 system comprising a first computer, a second computer, a first storage system coupled to said
3 first computer and comprising a first disk unit and a first disk control unit, and a second storage
4 system coupled to said second computer and comprising a second disk unit, a third disk unit, a
5 fourth disk unit, and a second disk controller unit, wherein said first disk control unit and said
6 second disk control unit are coupled via a network, the method comprising steps of:
7 copying data stored in said first disk unit to said second disk unit via said
8 network;
9 forming a duplex state between said first disk unit and said second disk unit,
10 wherein said first disk control unit, in response to a write request from said first computer, stores
11 write data associated therewith to both said first disk unit and to said second disk unit;
12 forming a simplex state, wherein said first disk control unit, in response to a write
13 request from said first computer, stores write data associated therewith only to said first disk
14 unit; and
15 subsequent to said step of forming a simplex state, copying data stored in said
16 second disk unit to said third disk unit and re-mapping a disk identifier, said second computer
17 using said disk identifier to access said storage system,
18 wherein said disk identifier is associated with said fourth disk unit before said re-
19 mapping and said disk identifier is associated with said third disk unit after said re-mapping,
20 whereby said fourth disk unit is accessed when said second computer accesses said storage

21 system at a time prior to said re-mapping and said third disk unit is accessed when said second
22 computer accesses said storage system at a time subsequent to said re-mapping.

1 28. (New): A method of sharing data according to claim 27, wherein said step
2 of copying data includes steps of:
3 converting a data format of data stored in said second disk unit to another data
4 format; and
5 storing data according to said other data format to said third disk unit.

1 29. (New): A storage system comprising:
2 a disk control unit; and
3 a plurality of disk units,
4 wherein said disk control unit is operable to form a duplex state between a first
5 disk unit and a second disk unit, wherein data associated with a write request from a first
6 computer is stored to both said first disk unit and to said second disk unit,
7 wherein said disk control unit is further operable to form a simplex state between
8 said first disk unit and said second disk unit, wherein data associated with a write request from
9 said first computer is stored only to said first disk unit,
10 wherein during said simplex state, data stored in said second disk unit is copied to
11 a third disk unit and a disk identifier is re-mapped,
12 wherein a second computer uses said disk identifier to access said storage system,
13 wherein before said disk identifier is re-mapped, it is associated with said third
14 disk unit so that said third disk unit is accessed when said second computer accesses said storage
15 system,
16 wherein after said disk identifier is re-mapped, it is associated with said second
17 disk unit so that said second disk unit is accessed when said second computer accesses said
18 storage system.

1 30. (New): The storage system of claim 29 wherein subsequent to said step of
2 re-mapping, forming a duplex state between said first disk unit and said third disk unit.

1 31. (New): A storage system comprising:
2 a disk control unit; and
3 a plurality of disk units,
4 wherein said disk control unit is operable to form a duplex state between a first
5 disk unit and a second disk unit, wherein data associated with a write request from a first
6 computer is stored to both said first disk unit and to said second disk unit,
7 wherein said disk control unit is further operable to form a simplex state, wherein
8 data associated with a write request from said first computer is stored only to said first disk unit,
9 wherein during said simplex state, data stored in said second disk unit is copied to
10 a third disk unit and a disk identifier is re-mapped,
11 wherein a second computer uses said disk identifier to access said storage system,
12 wherein before said disk identifier is re-mapped, it is associated with a fourth disk
13 unit so that said fourth disk unit is accessed when said second computer accesses said storage
14 system,
15 wherein after said disk identifier is re-mapped, it is associated with said third disk
16 unit so that said third disk unit is accessed when said second computer accesses said storage
17 system.

1 32. (New): The storage system of claim 31, wherein data stored on said
2 second disk unit is of a first data format and data stored on said third disk unit is of a second data
3 format.

1 33. (New): The storage system of claim 32, wherein said first data format is a
2 count key data format and said second data format is a fixed-length block format.

1 34. (New): A storage system comprising:
2 a disk control unit; and
3 a plurality of disk units,
4 wherein said disk control unit is operable to:
5 update data stored in a first disk unit and store update data and its address
6 to a second disk unit, in response to a write request from a first computer, said update
7 data and its address being determined from said write request;
8 write checkpoints to said second disk unit in response to transactions
9 executed by said first computer;
10 update data stored in a third disk unit by reading update data stored in said
11 second disk unit and write said update data to said third disk unit according to said
12 checkpoints;
13 form a duplex state between said third disk unit and a fourth disk unit by
14 copying data stored in said third disk unit to said fourth disk unit; and
15 service data access requests from a second computer by accessing said
16 fourth disk unit.

A/ 1 35. (New): A storage system comprising:
2 a disk control unit;
3 a plurality of disk units; and
4 a network connecting at least some of said disk units,
5 wherein said disk control unit is operable to copy data stored in a first disk unit to
6 a second disk unit via said network,
7 wherein said disk control unit is operable to form a duplex state between said first
8 disk unit and said second disk unit, wherein data associated with a write request from a first
9 computer is stored to both said first disk unit and to said second disk unit,
10 wherein said disk control unit is further operable to form a simplex state, wherein
11 data associated with a write request from said first computer is stored only to said first disk unit,

12 wherein during said simplex state, data stored in said second disk unit is copied to
13 a third disk unit and a disk identifier is re-mapped,

14 wherein a second computer uses said disk identifier to access said storage system,

15 wherein before said disk identifier is re-mapped, it is associated with said third
16 disk unit so that said third disk unit is accessed when said second computer accesses said storage
17 system,

18 wherein after said disk identifier is re-mapped, it is associated with said second
19 disk unit so that said second disk unit is accessed when said second computer accesses said
20 storage system.

1 36. (New): The storage system of claim 27, wherein data stored on said
2 second disk unit is of a first data format and data stored on said third disk unit is of a second data
3 format.
